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Bar-Zeev et al.

(54) GAZE-BASED USER INTERACTIONS

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See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

FOREIGN PATENT DOCUMENTS

EP 2940556 A1 11/2015 EP 3118722 A1 1/2017 (Continued)

OTHER PUBLICATIONS

International Preliminary Report on Patentability received for PCT Patent Application No. PCT/US2018/053415, dated Apr. 9, 2020, 10 pages.

(Continued)

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(57) ABSTRACT

In an exemplary process for interacting with user interface objects using an eye gaze, an affordance associated with a first object is displayed. A gaze direction or a gaze depth is determined. While the gaze direction or the gaze depth is determined to correspond to a gaze at the affordance, a first input representing user instruction to take action on the affordance is received, and the affordance is selected responsive to receiving the first input.

23 Claims, 51 Drawing Sheets

